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ABSTRACT

Mention is made of some of the more significant of relatively few attempts to use computers in British education. A computer-assisted instruction project at the University of Leeds is briefly described and projects at three other universities and in secondary schools are noted. The dearth of computer applications in counseling is cited, and the use of machine-scoring in standardized testing is overviewed. (LB)

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COMPUTERS IN EDUCATION - A BRIEF REVIEW

Kenneth M. Miller

In Britain the computer has proceeded more slowly in making its contributions to education than perhaps has been the case in other countries. Such a statement does not include the computer analysis of research data in asmuch as along with personnel in other social sciences, researchers in the educational field have made use of a wide range of statistical programs.

COMPUTER-BASED LEARNING (CAL)

One notable project has been operating at the University of Leeds, under the direction of Professor Lovell, for a little more than two years. At the time of this writing, the grant has just been extended for an additional three years.

The aim of the Leeds project is to derive and evaluate a variety of methods that could help students in their learning of techniques. The specific subject areas chosen were junior school mathematics, the teaching of English to immigrant children, university chemistry, and applied statistics in the social sciences. Major reasons for the choice of these areas were (1) they posed numerous difficulties for teachers and (2) they provided the computer with a range of different types of teaching problems. The following are four main emphases to the research involved:

1. The development of programs that control and manage the multi-access system, and the implementation of an author language and certain simulation packages through which teaching on the computer is conducted.
2. The development of an adaptive teaching system using modeling methods to manage the practice tasks in junior mathematics. A distinctive and original feature of this work is the computer "generation" of material to suit an individual's competence (rather than using pre-stored examples), and the computer itself also builds up error profiles for the learner and uses this information in the construction of remedial sequences.
3. The study and teaching of planning laboratory experiments in physical chemistry and the solution of statistical problems in the social sciences. This subproject, set at the university levell, uses prestored material but, in statistics particularly, has also incorporated a simulation package on which the student can run his experiments.
4. The teaching of English as a second language. This research has been conducted with immigrant children and has made extensive use of audiovisual equipment. So far, 17 papers have been published.

Other projects with more limited aims are in operation at other universities, such as programming (Edinburgh), computer-person communicating systems (Newcastle), and applied mathematics at the university level (Cambridge). One school that has its own computer has developed a progressive series of programmed tasks, made available to pupils on an individualized basis and moderated by a computer-controlled system.

Computer appreciation in secondary schools has been rapidly developing, and many secondary schools now have a terminal linked to a neighbourhood computer; for example, one college has 60 schools in its system. The mathematics association and the British Computer Society have been active in promoting the use of computer facilities among schools and in devising appropriate courses. The Society has prepared a number of publications and broadsheets on various aspects of the topic and also publishes an educational yearbook. The 1971/72 yearbook includes an annotated list of books and films available for schools,

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together with a five-country review of computer-assisted instruction.

COUNSELING

The counselling field has also been alerted to the contributions which the computer can make to education. Donald Super and his colleague made two presentations when they described the system being developed in conjunction with IBM, but so far it has not been possible to make any trials with this system. In the United Kingdom a system that is considerably less sophisticated in scope has been devised and begun by a team working in Leicester. This is an area of research and application wherein increased pilot work can be expected in the next few years.

EXAMINATIONS AND TESTING

Unlike their counterparts in America, local school systems seldom make regular use of standardized test programs, using tests developed by commercial organizations. The National Foundation for Educational Research (a non-profit body) has in the past 20 years developed tests of verbal and nonverbal reasoning, English, and mathematics. For the primary school and to a lesser extent for the secondary school, most of these tests are used usually in single classrooms or less regularly on a schoolwide basis. Occasionally a district will conduct a survey of some aspect of educational achievement.

Since 1950 the main use of tests has been for "11 plus", which has helped to determine the type of secondary school to which children would go. Although many thousands of children have been tested each year, scoring has been done by hand. For some time the small amount of school testing did not give rise to any demand for even the simple IBM 805 type of machine. A British company has developed a limited-scope, rigid-format document reader, and the IBM 1230 is in occasional use. A most significant step forward in document reading became possible when arrangements were made to obtain one of the readers developed by E.F. Lindquist at the Measurement Research Center of Iowa. This machine, since modified to have an open format and known as the DRS reader in the United Kingdom, is being used today in commerce as well as in education and in social science. It has proved particularly useful in the market survey field, both in research and in applied market research.

The immediate and main use of this machine in education has been applied to school leavers wishing to enter Universities. Currently there are eight boards (concerned with the General Certificate of Education that provide advance-level examinations for eighteen-year-olds and ordinary-level examinations for sixteen-year-olds. In addition to these eight boards, there are 14 others (concerned with the Certificate of Secondary Education) that also offer an examination for fifteen- and sixteen-year-olds. The GCE boards deal with the top 20 percent of ability range, while CSE boards are preparing examinations designed for the next 40 percent of secondary school pupils. Some of these 22 boards have begun to introduce multiple-choice papers into the previously essay-type examinations. Those boards which have introduced full copies of the new-type examinations have been turning to computer-assisted scoring; the DRS machine has been used by all but three boards that have introduced multiple-choice papers.

In 1972 another examining body, the City and Guilds of London Institute, which has the task of preparing examinations of a vocational or technical nature for students who attend colleges of further education between fifteen and eighteen years of age, transferred from another machine to the DRS machine... It is very likely that an open format will play a much larger part in scoring and in other data-processing operations within the educational field. Some idea of the growth of examinations usage is indicated by the actual figures for answers sheets for 1971 and 1972 --35,000 and 22,500, respectively, and the projection for 1973 is 600,000.

Already a number of such research organizations as the National Foundation for Educational Research and the General Nursing Council have made use of the

DRS reader in their research work, in particular for reading questionnaires and test answers. The Independent Assessment and Research Centre has been undertaking a large amount of research for the armed services. Special printings of six standard personality questionnaires have been prepared and have already been used with approximately 20,000 applicants for officer commissions.

Another group that has made full use of the computer in an educational setting is the medical school examining body. A unit has been set up in the Middlesex Hospital; one of the functions of this unit is to provide a bank of multiple-choice questions for use in medical education. The unit has been called upon to provide multiple-choice papers in particular subjects as far afield as Australia. The medical schools, however, are not using machine-scored answer sheets in any systematic way for their assessment purposes, primarily because only small numbers are seen at any one time.

This brief review has endeavoured to identify the main lines along which developments are progressing in the United Kingdom. Further information can be obtained from the following:

British Computer Society, 29 Portland Place, London, W.1.

Document Reading Services, 55 Newman Street, London, W.1.

School Education, the National Computing Centre, Quay House, Quay Street, Manchester, M33 HU.

Professor K. Lovell, University of Leeds, Institute of Education, Leeds 2.